Nottingham Trent University Course Specification

	Basic Course Information	
1.	Awarding Institution:	Nottingham Trent University
2.	School/Campus:	School of Science & Technology / Clifton Campus
3.	Final Award, Course Title and Modes of Study:	BSc (Honours) Applied Physics, FT/SW
4.	Normal Duration:	3 years (FT), 4 years (SW)
5.	UCAS Code:	F310

6. Overview and general educational aims of the course

Physics is concerned with the observation, understanding and prediction of natural phenomena and the behaviour of man-made systems. It is both a theoretical and practical discipline that continually evolves. Studying physics at university brings benefits that last a lifetime, and knowledge and skills that are valuable outside of physics.

If you are studying BTEC Applied Science with adequate Physics content then BSc (Hons) Applied Physics will enable you to study Physics at degree level. Having strengthened your mathematics skills in Year 1, at the end of Years 1 & 2 there are opportunities to transfer to other Physics courses in our Cluster, should you wish to do so. This flexibility will allow you to tailor your studies to emphasise specialisms in which you have become especially interested during your first 2 years at NTU. The course will develop your investigative, experimental, computational, and other transferable skills.

In summary, the course aims to:

- Provide you with an enjoyable and worthwhile educational experience in the field of physics.
- Enable you to graduate with a good knowledge of those areas of physics and practical skills relevant to the application of physics in the modern world.
- Prepare you for a wide range of employment within the broad area of applied physics, as well as for postgraduate studies.
- Enable you to build on your BTEC Applied Science background.

Throughout the course you will be engaged in activities that will enhance your employability in the applied physics sector of industry, from the use of industry standard equipment and software to the development of the professional skills that are essential to the career physicist.

7. **Course outcomes**

Course outcomes describe what you should know and be able to do by the end of your course if you take advantage of the opportunities for learning that we provide.

Knowledge and understanding

By the end of the course you should be able to:

K1. Demonstrate knowledge of most of the fundamental laws and principles of physics, and exhibit competence in the application of these principles to diverse areas of the discipline. (B)
K2. Evidence the ability to execute and analyse critically the results of an experiment or investigation and draw valid conclusions. (B)
K3. Identify the relevant physical principles, translate problems into mathematical statements, and apply your knowledge to obtain order-of-magnitude or more precise solutions, as appropriate, to both problems with a well-defined solution and those that are open-ended. (B)
K4. Communicate scientific information to a wide range of audiences. In particular, you should be able to produce clear and accurate scientific reports. (B)
K5. Demonstrate a sound knowledge of laboratory apparatus and techniques. (B)
K6. Demonstrate an in-depth knowledge of topics of an applied nature.
K7. Apply a working knowledge of a variety of experimental, mathematical and/or computational techniques applicable to research within physics. (B)

(B) Indicates outcomes having specific reference to Quality Assurance Agency benchmark statements for Physics Bachelor's Degrees (February 2017).

Skills, qualities and attributes

By the end of the course you should be able to:

S1. Use laboratory equipment commonly employed in physics in a safe and competent manner.
S2. Demonstrate good written and oral communication skills and present information in a clear and concise manner. (B)
S3. Use appropriate IT packages/systems effectively for the analysis of data and the retrieval of information. (B)
S4. Plan work and be able to work effectively as part of a team or independently. (B)
S5. Use appropriate mathematical tools to solve both problems with a well-defined solution and those that are open-ended. (B)
S6. Find, evaluate and manage information.
S7. Manage your own learning and make use of appropriate texts and other learning resources. (B)
S8. Explain what constitutes unethical scientific behaviour, and conduct your work, and especially your research activities, in an ethical manner.

8. Learning & Teaching Methods

The teaching and learning strategies for this course have been developed to support your acquisition of the knowledge, understanding and skills expected of a professional physicist, and have evolved over a number of years as a result of feedback, review and reflection. Autonomous learning is encouraged and motivated within the course through the following practices:

- Interaction with other students through work based in small groups.
- Presentation of concepts and findings to fellow students and tutors: this will help you to organise your thoughts and reflect on your understanding.
- Discussion of your ideas with tutors. Both self-directed and staff-directed investigation is important to the development of your learning autonomy. This culminates in the substantial final year project, where you will work on an advanced topic following an evolving plan negotiated with, and monitored by, your project supervisor.
- The application of the knowledge that you have gained within modules. The careful progression between the levels in the course ensures that you build upon and develop earlier knowledge and skills.

You will be expected to take progressively more responsibility for your own learning at each level.

Course delivery is supported by strategies to encourage you to consolidate and apply your knowledge. In order to realise the course aims, the following practices are adopted:

- Lectures are used to introduce and develop concepts and to explore their application. A subset of the core modules covers the fundamental physical laws to a greater depth at each level, and these laws are subsequently applied and reinforced in the other physics modules.
- Directed reading is used to supplement the concept development initiated through the lectures.
- Laboratory sessions are used to develop your practical skills and to underpin the lectures and directed reading.
- Seminars and examples classes are used to consolidate the application phase of your learning process: sometimes these will be integrated with the lectures.
- The Mathematical skills that you acquire in your first year will be applied in subsequent modules in order to deepen your understanding of the physics theories and applications covered within them.
- Small projects in various modules help you to learn how to plan and execute investigate work.
- The Physics Industrial Liaison Group supports the course team in the design and development of the course, and in formulating and assessing various module tasks.
- Supervised extended project work enables you to develop a deeper understanding of some of the concepts and applications, and helps to promote the development of your personal skills as a professional physicist.

All modules have a site on NOW, the Nottingham Trent University Online Workspace. NOW provides important information on each module, such as the syllabus, teaching schedule and assessment plan. Most module sites also store lecture notes and past examination papers, and provide links to other internet sites which are useful for that particular module. NOW also has a site that provides information at course level, such as notices and electronic versions of course handbooks, etc.

9. Assessment Methods

Broadly speaking, most of the taught modules are assessed by both examination and some form of coursework, whilst the project is assessed entirely by coursework.

Physics is a discipline which is amenable to many types of assessment, and the philosophy of the teaching team is that the assessment strategies used within a particular module are chosen to be the most appropriate for that aspect of study. Often two or more different types of assessment are grouped together under a general heading, e.g. a "Portfolio" may include a range of tasks designed to demonstrate the acquisition of numerous skills.

Listed below are the main types of assessment that you will experience on the BSc Applied Physics course:

(a) Formal Laboratory Report
This assesses your ability to carry out a laboratory experiment and report on the findings in a scientific manner, discussing assumptions, error margins, conclusions, etc.

(b) Laboratory Notebook Entry
These encourage you to produce a contemporaneous record of laboratory activities, with suitable graphs, etc. A subset of the laboratory notebook entries will be expanded to form the formal laboratory reports.

(c) Formal Examination
These are used to assess your knowledge base and ability to integrate material under time constraints. Most are traditional closed book papers, but a small number may be revealed or open-book papers.

(d) Journal-Style Article
These test your ability to produce clear and accurate reports of investigations that you have carried out, in the style favoured by the major international physics journals.

(e) Oral Presentation
This assesses your oral communication skills and presentation skills using PowerPoint. Some of these are individual talks, whilst others are group presentations.

(f) Project
The project, carried out in the final year, tests your ability to design and implement an extended programme of work, and communicate the findings in a report written in an appropriate scientific manner.

(g) Literature Review
This forms part of the project and assesses your ability to find, evaluate and manage information.

(h) Poster
This also forms part of the project and tests your ability to condense your findings and present them in a visual format. You will also be expected to answer questions on the project based on the poster, as a means of assessing your oral communication skills.

(i) Problem Based Assignment
These assess your ability to apply mathematical and computational techniques to problems in physics.

(j) Class Tests
These are short tests, often taken midway through the year. In some modules these are either open-book or partially revealed tests. Again they assess your knowledge base under timed conditions.

(k) Mini-Projects
These are small projects, often conducted in collaboration with industry, that help you apply your learning to real-world scenarios.

(l) Employability Tasks
You will be given a number of tasks aimed at improving your employability: these will be assessed and will contribute towards the overall mark for your project.

There are a number of pieces of work that are not formally assessed but which do form a valuable part of your learning experience. For example, in many modules you will be issued with seminar problem sheets, and you will be expected to tackle these for yourself before the answers are provided, either in class or online. You are expected to fully engage with these activities, as they form an invaluable part of the process of developing you as an autonomous learner. You will also receive a lot of informal formative feedback on a one-to-one basis during laboratory sessions and after oral and poster presentations.

10. **Course structure and curriculum**

BSc (Honours) Applied Physics can be completed in 3 academic years if studied full-time, or in 4 years if you choose to take the sandwich version. Each academic year is comprised of 30 weeks divided into 3 terms.

BSc (H) Applied Physics is a modular-based degree that addresses key aspects of applied physics. The modules selected on the degree are designed to meet the course learning outcomes. The modules forming the course are given below, together with their credit point rating:

Year1:
Ideas of Motion: Galileo to Einstein (20cp)
Scientific Programming for Industrial Applications (20cp)
Laboratory Instrumentation & Physics Skills (20cp)
Workshop (20cp)
Foundation Mathematics (20cp)
Mathematical Techniques (20cp)

Year 2:
Matter: Evidence for Quantisation (20cp)
Optics & Semiconductors (20cp)
Digital Techniques (20cp)
Nuclear Materials Science (20cp)
Thermal & Environmental Physics (20cp)
Ionising Radiation & Non-Invasive Imaging (20cp)

Year 3:
Laboratory Interfaces & Control (20cp)
Advanced Experimental Techniques (20cp)
Physics & Technology of Nuclear Reactors (20cp)
Practical Electronics (20cp)
Project & Professional Skills (40cp)

11. Admission to the course

For current information regarding all entry requirements for this course, please see the 'Applying' tab on the NTU course information web page.

12. Support for Learning

We will work with you to ensure that you settle into your new academic environment and that your studies go well: you will find that there are many people to support you at Nottingham Trent University.

You will have full access to Nottingham Trent University's Student Support Services. In addition, School based support networks are in place to offer you support, guidance and advice on academic and personal issues. Within the course, you will experience the full support of the Physics subject team. The Head of Department for Physics and Mathematics, with support from the Courses Manager, Year Tutors, Module Leaders, and your Personal Tutor, takes overall responsibility for your support and guidance. Your Module Leaders will offer guidance and support for each specific module that you take: indeed, the Physics subject team operates an open door policy and you are welcome to discuss academic problems linked to a specific module with the lecturer concerned.

Academic staff can be contacted by e-mail, telephone, letter, or in person.

As a new student you will experience a minimum of a 3 day induction period at the commencement of your first academic year. Induction will inform you about:

- Student Support Services at University, School and Course level;
- University policies and procedures on academic systems;
- Personal development planning;
- Timetable issues, room allocations and location;
- Use of the University's virtual learning environment (the NOW);
- University, School and Course Handbooks;
- Enrolment procedures;
- Computing, IT and Library services;
- Health and Safety procedures.

During your induction you will be assigned a Personal Tutor and informed about the best way to get in touch with your Course Leader and Module tutors. Every year, you will have regular timetabled sessions with your Personal Tutor, in small groups. Your group tutorials will help you to reflect on your approaches to study and make connections between modules, integrating material from across the curriculum and encouraging you to achieve your maximum potential. You will also have an opportunity to discuss and deal with any personal or course-related issues which may be affecting your studies and get advice on what support the university can offer. Personal tutorials can also be used for personal development planning and skills development.

Student Mentors are also used to provide you with learning support. Student Mentors are typically students at Level 5 and above of their course, who provide some form of mathematics, academic writing or module-specific support. Such support is usually available on a 'help desk' basis.

The School operates a "one-stop-shop" administrative centre for assessment hand-in and return, queries about fees, and other general queries. The friendly staff in the centre are always available to help.

For accommodation matters, University Accommodation Officers will provide you with information, guidance and continuing support, for example hall of residence, private rented accommodation, and the Landlord Approval Scheme. The Accommodation Services can be accessed through www.ntu.ac.uk.

The University also has a Virtual Learning Environment called NOW (Nottingham Trent University Online Workspace). General information concerning the curriculum, module specifications, timetables, assessment schedules, etc. are available on the course sites, whereas module sites give syllabus details, assessment details, and, frequently, lecture material. This is an important educational aid whose use is steadily expanding.

The Clifton Library houses a vast number of physics textbooks, and has access to a reasonable number of relevant periodicals, many in electronic form. Library & Learning Resources (LLR) staff offer support for your learning needs. Both group and individual sessions are available to enable you to use the library resources to the full.

13. Graduate destinations / employability

Graduate employability is fundamental to the strategic aims of Nottingham Trent University, and this is reflected by our consistently high standings in the UK University league tables for graduate employment.

By the end of the course you will have developed a range of transferable skills, making you more attractive to potential employers. By its nature, BSc Applied Physics will provide you with an excellent grounding in practical skills, including the use of professional software, that will be highly valued within the technology sector. These employers will also value your technical knowledge base and communication skills.

Graduates in physics are needed in industry where their training in the methodology of physics equips them for positions in engineering, management and administration in a wide range of roles with a strong technological bias.

A proportion of graduates continue their studies at either masters or PhD level.

There is a shortage of qualified physics teachers in schools, which is not being met by the available graduates. NTU offers a PGCE in Physics Secondary Education, which you could embark upon following graduation from BSc Technological Physics, should you obtain a sufficiently high classification.

The University's Employability team Centre helps you find suitable employment. It offers sessions on such topics as interview technique and filling in application forms, and well as having psychometric tests available to see what type of careers suit your personality.

14. **Course standards and quality**

The course teaching team takes day-to-day responsibility for managing the Physics Cluster of Courses. The design and delivery of the course are under the control of the Courses Committee. This committee has student representatives on it, who are elected by other students. The role of the student representatives is to gather feedback from fellow students, write a report, and present this at the Courses Committee. Student reps can also bring any concerns of students to the Courses Manager, enabling problems to be dealt with in a timely manner.

A team of External Examiners monitors the standards and quality of the Physics Cluster of Courses. Each External Examiner produces a detailed written annual report: these are considered by the Courses Committee, which uses the reports as one source of evidence when drawing up an action plan for the forthcoming year. Academic staff gather student feedback towards the end of each module, and this is reported on in the module leader's report, which also discusses all aspects of the delivery of the module for that academic year. The Courses Manager, on behalf and with the support of the Courses Committee, produces an annual Interim Course Report (ICR). ICRs are informed by numerous sources, including the External Examiners' reports, module leaders' reports, contributions for each individual member of the Physics teaching team, progression & achievement statistics, module feedback questionnaires, and the National Student Survey (NSS). The ICR is considered at a meeting of the School of Science & Technology's Academic Standards & Quality Committee, where any issues arising are noted and the actions taken to alleviate them are reported back. In turn, the ICR informs the annual School Quality and Enhancement Plan (SQEP), which is scrutinised by senior University staff charged with overseeing the maintenance of the institution's high standards of educational provision.

The School operates a peer observation of teaching policy, whereby all lecturers are seen regularly in a teaching capacity by other lecturers within the teaching team. Suggestions for improvements are made, and other members of staff informed of good practices.

At the design stage of the course, the outcomes were aligned to those suggested within the benchmark statements of the Quality Assurance Agency for Higher Education. Statements from the Institute of Physics concerning key skills and knowledge for university level physicists were also given due consideration at this point. Members of the Physics Industrial Liaison Group were also involved in course design.

15. **Assessment regulations**

The University's Common Assessment Regulations can be found in its Quality Handbook. There are no course specific assessment features.

You will receive a grade for each module in accordance with the NTU Grade Based Assessment (GBA) scheme. Pass grades fall into the following bands:
First Class = grade points 13-16
Upper Second Class (2.1) = grade points 10-12
Lower Second Class (2.2) = grade points 7-9
Third Class = grade points 4-6
Your final degree classification will be determined by either the weighted arithmetic mean of the contributing grade points, or by the majority grade, whichever results in the higher outcome. Your majority grade will be based on 140 contributing credits (cp), where 120cp are from Year 3 / Level 6 (FT) or Year 4 / Level 6 (SW) and 20cp are from Year 2 / Level 5, these 20 Level 5 credits being based on your overall arithmetic mean for that year's 120 credits. Your majority grade is determined by establishing the highest degree classification at which more than half of your contributing credits have been achieved. For example, for your majority grade to be a first class, then more than half your contributing credits need to have been graded at a first; similarly, for your majority grade to be an upper 2nd, more than half your contributing credits must have been graded at an upper 2nd or higher.

16. **Additional Information**

Collaborative partner(s):	None
Course referenced to national QAA Benchmark Statements:	The QAA descriptors for a qualification at BSc level in Physics & Astronomy have informed the design of this course.
Course recognised by:	
Date implemented:	September 2018
Any additional information:	